Actual Causes of Death in the United States, 2000

In a seminal 1993 article, McGinnis and Foege described the major external (nongenetic) modifiable factors that contributed to death in the United States and labeled them the "actual causes of death" (1). We used published causes of death for the year 2000, relative risks, and prevalence estimates from published literature to update actual causes of death in the United States (2).

METHODS

Our literature review used a computerized MEDLINE database search of English-language articles that identified epidemiological, clinical, and laboratory studies linking risk behaviors and mortality. To identify the causes and number of deaths, we used mortality data reported in 2000 to the Centers for Disease Control and Prevention (CDC) (3).

We used the following formula to calculate attributable fractions for each disease: $[(P_0 + \sum P_i (RR_i))-1]/[P_0 + \sum P_i (RR_i)]$, where P_0 is the percentage of Americans not engaging in the risk behavior, P_i is the percentage of Americans engaging in separate categories of the risk behavior, and RR_i is the relative risk of death of each separate category relative to the none. For instance, in the case of smoking, P_0 is the percentage of persons who never smoked, P_1 is the percentage of ex-smokers, P_2 is the percentage of current smokers, RR_1 is the relative risk of a certain death code for ex-smokers compared to those who never smoked, and RR_2 is the relative risk of that death for current smokers compared to those who never smoked. We then multiplied estimates of the cause-attributable fraction of preventable deaths by total mortality data. The number of deaths in the United States in 2000 was 2,403,351 (3).

Smoking

In order to compute the number of deaths attributable to smoking please use SAMMEC. Programs are available for SAMMEC at (http://apps.nccd.cdc.gov/sammec/), and further details on smoking are available at www.cdc.gov/tobacco.

We used methodology and software from previous CDC reports to compute the annual smoking-attributable mortality for 2000 (4,5). As in previous reports, we used relative risks for each cause of death from the American Cancer Society's Cancer Prevention Study II (CPS II) (6) and included deaths due to secondhand smoking.

SAMMEC was used to estimate the amoking attributable deaths. The prevalence of smoking in 2000 was for current smokers (25.5% males, 22.5 females) and for former smokers (30.5%, 22.9%) for ages 35-64 and current smokers (10.1% males, 9.4% females) and for former smokers (55.5%, 30.1%) for ages 65 or older. This yields about 399,000 deaths from smoking in 2000. We estimate that about 435,000 deaths were attributable to smoking in 2000 with 35,000 deaths from second hand smoking and 1000 for infant deaths due to maternal smoking (4).

Poor Diet and Physical Inactivity

To assess the impact of poor diet and physical inactivity on mortality, we computed annual deaths due to overweight. To derive the attributable number of deaths due to overweight, we used estimates from CDC's 1999 and 2000 National Health and Nutrition Examination Surveys (NHANES 1999-2000) (7). We used the same procedure reported by Allison et al. to estimate annual overweight-attributable deaths (8). We used BMI range of 23 to 25 as our reference category to match the methodology of Allison et al. Using NHANES 1999-2000 data, the percentages for BMI cut points were 22.03% (<23), 15.09% (23 to <25), 7.49% (25 to <26),

7.36% (26 to <27), 6.23% (27 to <28), 6.30% (28 to <29), 5.94% (29 to <30), 16.95% (30 to 35), and 12.62% (>35).

We used hazard ratios reported previously (8) to recompute annual deaths for 6 major population-based studies: Alameda County Health Study (relative risks were; 1.39, 1.00, 0.98, 0.86, 1.20, 1.26, 1.23, 1.36, and 2.79 for all participants and 1.23, 1.00, 0.94, 0.88, 1.23, 1.07, 1.14, 1.64, 2.76 for nonsmokers only, respectively), Framingham Heart Study (relative risks were; 1.12, 1.00, 0.96, 1.11, 1.04, 1.08, 1.41, 1.60, 1.94 for all participants and 1.26, 1.00, 1.09, 1.08, 1.16, 1.35, 1.65, 1.52, 1.96 for nonsmokers only, respectively), Tecumseh Community Health Study (relative risks were; 1.20, 1.00, 1.18, 0.89, 1.12, 0.92, 0.94, 1.45, and 1.87 for all participants and 1.05, 1.00, 1.17, 1.14, 0.83, 0.81, 1.32, 1.60, 1.52 for nonsmokers only, respectively), American Cancer Society Cancer Prevention Study I (relative risks were; 1.07, 1.00, 1.02, 1.06, 1.08, 1.14, 1.21, 1.35, and 1.72 for all participants and 1.05, 1.00, 1.04, 1.08, 1.10, 1.16, 1.20, 1.36, 1.76 for nonsmokers only, respectively), Nurses Health Study (relative risks were; 1.06, 1.00, 0.92, 0.96, 1.09, 1.21, 1.32, 1.49, and 1.89 for all participants and 0.91, 1.00, 1.00, 1.06, 1.20, 1.34, 1.50, 1.66, 1.80 for nonsmokers only, respectively), and NHANES I Epidemiologic Follow-up Study (relative risks were; 1.04, 1.00, 0.96, 1.11, 0.96, 1.40, 1.06, 1.33, and 1.68 for all participants and 1.24, 1.00, 0.88, 0.91, 0.95, 1.16, 1.26, 1.61, 2.24 for nonsmokers only, respectively) (9-14). The mean estimate of the annual number of overweight-attributable deaths in 2000 for all subjects was 414,423.

The prevalence of overweight used in the study is based on data from 1999-2000. Because the effects of overweight on mortality may not appear until some years after a person becomes overweight, it is likely that the increase in prevalence of overweight in the 1990s overestimates the current actual number of deaths. However, the total number of deaths from the

1999-2000 data may well be the expected number of deaths in the next few years. Thus, we believe a more accurate and conservative estimate for overweight mortality in 2000 would be 350,000--the rounded average of 2000 and 1991 from Allison et al. estimates (414,423 and 280,184).

Nutritional deficiencies alone (ICD-10 codes E40-E64) were reported as the causes of 4,242 deaths in 2000. We assumed that nutritional deficiencies contributed about 15,000 (about 3 times of what is reported on the death certificates due to possible under-reporting). Therefore, we estimate that 365,000 deaths were attributable to poor diet and physical inactivity.

Alcohol Consumption

In order to compute the number of deaths attributable to alcohol consumption please use ARDI, it is available at (http://apps.nccd.cdc.gov/ardi/Homepage.aspx). More detailed information on alcohol are available at www.cdc.gov/alcohol.

We used relative risks from the *Australian National Drug and Safety Report* that were based on mortality derived from pooled data of several studies (15,16). Relative risk values were 1.33 for "hazardous drinking" (4.01 to 6 drinks per day for males, 2.01 to 4 for females) and 1.47 for "harmful drinking" (6.01 or more for males, 4.01 or more for females), in contrast to "low drinking" (0.26 to 4 drinks for males, 0.26 to 2 for females) and "abstinence" (0 to 0.25 for males and females).

We used BRFSS data to compute the number of alcohol-attributable deaths for the US population aged 18 or older. The BRFSS also asked questions about binge drinking (i.e. 5 or more drinks per occasion). To account for the effect that respondents appeared not to include binge drinking in their reported regular drinking, we reran our analyses, adding 5 drinks per binge occasion to average drinks per day (17). The prevalence of alcohol consumption was

68.8% for “abstinence” (57.7% for men and 79.1% for women), 27.7% for “low drinking” (37.7% for men and 18.4% for women), 1.9% for “hazardous drinking” (2.1% for men and 1.7% for women), and 1.6% for “harmful drinking” (2.5% for men and 0.8% for women). We computed total mortality attributed to the adverse consequences of alcohol abuse rather than the potential harms and benefits associated with any alcohol use. We adjusted the prevalence of alcohol consumption to reflect the relative risks above; low drinking 88.7%, hazardous 6.15%, and harmful 5.15%. Using this approach, the total number of deaths attributable to alcohol was 103,350.

In another approach, we aggregated alcohol-related deaths from specified ICD codes that were summed to provide an overall estimate of deaths. In 2000, 19,358 deaths were reported as “alcohol-induced” (ICD-10 codes F10, G31.2, G62.1, I42.6, K29.2, K70, R78.0, X45, X65). In addition, 16,653 persons were killed in “alcohol-related” crashes (18). We estimate another 34,797 deaths in 2000, using BRFSS alcohol consumption data and disease-specific relative risks from the Australian study for oropharyngeal (ICD-10 C00-C14) (RR 1.28 for “hazardous” and 3.72 for “harmful”), oesophageal (ICD-10 C15) (RR 1.31 for “hazardous” and 1.79 for “harmful”), liver (ICD-10 C22) (RR 2.09 for “hazardous” and 2.48 for “harmful”), laryngeal (ICD-10 C32) (RR 2.13 for “hazardous” and 2.69 for “harmful”), and female breast cancers (ICD-10 C50) (RR 1.20 for “hazardous” and 1.54 for “harmful”); stroke (ICD-10 I63, I 65-67, I 69.3 I60-62, I 69,0-I69,2) (males RR 1.54 for “hazardous” and 3.0 for “harmful”, females RR 0.83 and 13.7); hypertensive heart disease (ICD-10 I11, I 13) (males RR 1.40 for “hazardous” and 2.01 for “harmful”, and for females RR 1.49 for “hazardous” and 2.11 for “harmful”); and other chronic liver disease and cirrhosis (ICD-10 K73-74). This totals to 70,808 deaths in 2000

from these factors alone. In the Australian study, all-cause mortality was also higher than the summation of cause-specific mortality.

Taking these various numbers into account, our best estimate for total alcohol-attributable deaths in 2000 is about 85,000, based on the conservative estimate from cause-specific deaths (70,808) and the high estimate using all-cause mortality (103,350).

Microbial Agents

We excluded human immunodeficiency virus (HIV) from this category and included it with sexual behaviors to be consistent with the McGinnis and Foege analysis. In 2000, influenza (ICD10: J10-J11) and pneumonia (ICD-10:J12-J18) accounted for 65,313 deaths, septicemia (ICD-10: A40-A41) for 31,224, and tuberculosis (ICD-10: A16-A19) 776, a total of 97,313 deaths (4). Because pneumonia and septicemia occur at higher rates among cancer, heart, lung, and liver disease patients, some of these deaths are attributable to other diseases and their actual causes, such as smoking, poor diet, and alcohol consumption (19-23). We estimate that 75,000 (about 75% of total mortality from microbial agents on the death certificates) deaths were attributable to microbial agents in 2000.

Toxic Agents

Estimating the number of deaths due to toxic agents is more challenging than any of the other risk factors due to limited published research and the challenges of measuring exposure and outcome. Toxic agents are associated with increased mortality from cancer, respiratory, and cardiovascular diseases (24-27). We used the National Morbidity, Mortality, and Air Pollution Study (NMMAPS) to estimate mortality due to air pollution (28). The study assessed the association between air pollution and mortality and morbidity in 90 cities in the US. Only particulate matter was associated with a significant increase in mortality, approximately 0.5%

increase in total mortality for each 10 μ/m^3 increase in PM_{10}. Previous studies reported a range of 0.4% to 1% for that association (29,30). We used 23.8 μ/m^3 as the daily average of PM_{10} concentration in 2000 (31), which result in an estimate of 24,000 deaths a year (range 22,000 to 52,000 deaths) from air pollution alone.

The National Institute for Occupational Safety and Health (NIOSH) estimates that about 113,000 deaths are due to occupational exposure from 1968 to 1996 (32). The number of deaths caused by occupational exposure has declined during that period. In 1996, NIOSH estimated 3,119 deaths from pneumoconiosis and 1,176 from asbestosis. Although, particulate air pollution account for the majority of toxic agents mortality (about 60%) (33), indoor air pollution, environmental tobacco smoke, radon, lead in drinking water, and food contamination are associated with increased mortality (34,35). We estimate that the toxic agents are associated with 2.3% of total mortality in 2000. We report 55,000 deaths attributable to toxic agents. This estimate is our least certain of the various causes.

Motor Vehicles

The ICD-10 codes we used were; V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2. Motor-vehicle crashes involving passengers and pedestrians caused 43,354 deaths in 2000 (3).

These numbers are directly ascertained from death certificate reports.

Firearms

In 2000, 16,586 deaths were due to intentional self-harm (suicide) by discharge of firearms (ICD-10, X72-X74). Assault (homicide) by discharge of firearms (X93-X95) caused 10,801 deaths. Accidental discharge of firearms (W32-W34) caused 776 deaths, while discharge

of firearms, undetermined intent (Y22-Y24), caused 230 deaths. The rest 359 deaths, were due to legal intervention (Y35). Firearms caused 28,663 deaths among Americans in 2000 (3). These numbers are directly ascertained from death certificate reports.

Sexual Behavior

US mortality from sexually transmitted diseases is declining due to the availability of earlier and better treatment, especially for HIV (36,37). In 2000, HIV disease (ICD-10, B20-B24) was coded for 14,478 deaths, viral hepatitis (ICD-10 B15-B19) was coded for 5,357 deaths, and cervical cancer (ICD-10 C53) was coded for 4,200 deaths. We used the ICD-10 codes; for Hep B: B16, B16.0, B16.1, B16.2, B16.9, B17.0, B18.0, B18.1 and for Hep C: B17.1, B18.2. We estimate that 20,000 deaths in 2000, with a range of 18,000 to 25,000 deaths, were due to sexual behavior mainly HIV; other contributors were hepatitis B and C viruses and cervical cancer.

Illicit Use of Drugs

Illicit drug use is associated with suicide, homicide, motor-vehicle injury, HIV infection, pneumonia, violence, mental illness, and hepatitis (15,16,38-44). We used the following ICD-10 codes; F11.0-F11.9, F12.0-F12.9, F13.0-F13.9, F14.0-F14.9, F15.0-F15.9, F16.0-F16.9, F18.0-F18.9, F19.0-F19.9, R78.2, T40, T40.4-T40.6, X42-X42.9, X62-X62.9, Y10-Y12.9, Z88.5. These ICD-10 codes accounted for 9796 total deaths in 2000. In the Australian study, the attributable fraction for illicit drug use from AIDS was 0.045 for males and 0.188 for females, for Hepatitis B it was 0.29 for males and 0.29 for females, and for Hepatitis non-A, non-B it was 0.42 for males and 0.42 for females. Overall, we estimate that illicit drug use caused 17,000 deaths in 2000 based on the combination of the death certificates count and the total estimate from the attributable fraction.

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INSTRUCTIONS

1. Change the yellow values to be relevent to the data set being considered.

2. Use the "solver" under the tools menu to update the red values.

DATASET:Tecumseh

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.2000	0.0110	0.0110	0.002414	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0092***	0.0091	0.001379	
Recovered P(D)	0.011269	**25-26**	0.075	1.1800	0.0108	0.0108	0.000807	**25,634**
criterion	0.000000	**26-27**	0.074	0.8900	0.0082	0.0081	0.000599	**-15,414**
		27-28	0.062	1.1200	0.0103	0.0102	0.000637	**14,218**
		28-29	0.063	0.9200	0.0084	0.0084	0.000530	**-9,594**
		29-30	0.059	0.9400	0.0086	0.0086	0.000511	**-6,784**
		30-35	0.170	1.4500	0.0133	0.0132	0.002242	**144,843**
		> 35	0.126	1.8700	0.0172	0.0170	0.002149	**208,093**

ANSWER **360,997**

DATASET:Tacumseh

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.0500	0.0099	0.0099	0.002178	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0095***	0.0094	0.001421	
Recovered P(D)	0.011269	**25-26**	0.075	1.1700	0.0111	0.0110	0.000825	**24,941**
criterion	0.000000	**26-27**	0.074	1.1400	0.0108	0.0107	0.000790	**20,186**
		27-28	0.062	0.8300	0.0079	0.0078	0.000487	**-20,778**
		28-29	0.063	0.8100	0.0077	0.0076	0.000481	**-23,486**
		29-30	0.059	1.3200	0.0125	0.0124	0.000737	**37,205**
		30-35	0.170	1.6000	0.0151	0.0150	0.002547	**198,800**
		> 35	0.126	1.5200	0.0144	0.0143	0.001802	**128,328**

ANSWER **365,195**

INSTRUCTIONS

1. Change the yellow values to be relevent to the data set being considered.

2. Use the "solver" under the tools menu to update the red values.

DATASET:CPS1-All

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.0700	0.0101	0.0101	0.002217	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0095***	0.0094	0.001419	
Recovered P(D)	0.011269	**25-26**	0.075	1.0200	0.0096	0.0096	0.000719	**2,933**
criterion	0.000000	**26-27**	0.074	1.0680	0.0101	0.0100	0.000739	**9,796**
		27-28	0.062	1.0860	0.0103	0.0102	0.000636	**10,486**
		28-29	0.063	1.1400	0.0108	0.0107	0.000675	**17,257**
		29-30	0.059	1.2090	0.0114	0.0114	0.000675	**24,282**
		30-35	0.170	1.3510	0.0128	0.0127	0.002150	**116,289**
		> 35	0.126	1.7230	0.0163	0.0162	0.002038	**178,032**

ANSWER **359,075**

DATASET:CPS1-Non-smokers

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.0510	0.0099	0.0098	0.002162	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0094***	0.0093	0.001409	
Recovered P(D)	0.011269	**25-26**	0.075	1.0430	0.0098	0.0097	0.000729	**6,259**
criterion	0.000000	**26-27**	0.074	1.0880	0.0102	0.0102	0.000747	**12,584**
		27-28	0.062	1.1090	0.0104	0.0104	0.000645	**13,193**
		28-29	0.063	1.1690	0.0110	0.0109	0.000687	**20,679**
		29-30	0.059	1.2010	0.0113	0.0112	0.000666	**23,186**
		30-35	0.170	1.3610	0.0128	0.0127	0.002151	**118,739**
		> 35	0.126	1.7650	0.0166	0.0164	0.002073	**186,988**

ANSWER **381,629**

INSTRUCTIONS

1. Change the yellow values to be relevent to the data set being considered.

2. Use the "solver" under the tools menu to update the red values.

DATASET:Framingham

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.1200	0.0099	0.0098	0.002168	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0088***	0.0088	0.001327	
Recovered P(D)	0.011269	**25-26**	0.075	0.9600	0.0085	0.0084	0.000632	**-5,485**
criterion	0.000000	**26-27**	0.074	1.1100	0.0098	0.0098	0.000718	**14,812**
		27-28	0.062	1.0400	0.0092	0.0091	0.000570	**4,561**
		28-29	0.063	1.0800	0.0095	0.0095	0.000598	**9,222**
		29-30	0.059	1.4100	0.0125	0.0124	0.000735	**44,498**
		30-35	0.170	1.6000	0.0141	0.0140	0.002378	**185,663**
		> 35	0.126	1.9400	0.0171	0.0170	0.002144	**216,242**

ANSWER **469,513**

DATASET:Framingham

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.2600	0.0106	0.0105	0.002319	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0084***	0.0084	0.001262	
Recovered P(D)	0.011269	**25-26**	0.075	1.0900	0.0092	0.0091	0.000682	**11,735**
criterion	0.000000	**26-27**	0.074	1.0800	0.0091	0.0090	0.000664	**10,250**
		27-28	0.062	1.1600	0.0097	0.0097	0.000604	**17,347**
		28-29	0.063	1.3500	0.0113	0.0113	0.000710	**38,342**
		29-30	0.059	1.6500	0.0139	0.0138	0.000817	**67,054**
		30-35	0.170	1.5200	0.0128	0.0127	0.002150	**153,156**
		> 35	0.126	1.9600	0.0165	0.0163	0.002060	**210,131**

ANSWER **508,016**

INSTRUCTIONS

1. Change the yellow values to be relevent to the data set being considered.

2. Use the "solver" under the tools menu to update the red values.

DATASET:NHANESI

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.0400	0.0100	0.0099	0.002186	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0096***	0.0095	0.001440	
Recovered P(D)	0.011269	**25-26**	0.075	0.9600	0.0092	0.0092	0.000686	**-5,952**
criterion	0.000000	**26-27**	0.074	1.1100	0.0106	0.0106	0.000779	**16,073**
		27-28	0.062	0.9600	0.0092	0.0092	0.000571	**-4,951**
		28-29	0.063	1.4000	0.0134	0.0133	0.000840	**49,959**
		29-30	0.059	1.0600	0.0102	0.0101	0.000601	**7,077**
		30-35	0.170	1.3300	0.0128	0.0127	0.002148	**110,929**
		> 35	0.126	1.6800	0.0161	0.0160	0.002017	**169,903**

ANSWER **343,038**

DATASET:NHANESI

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.2400	0.0107	0.0106	0.002335	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0086***	0.0086	0.001291	
Recovered P(D)	0.011269	**25-26**	0.075	0.8800	0.0076	0.0075	0.000564	**-16,021**
criterion	0.000000	**26-27**	0.074	0.9100	0.0078	0.0078	0.000573	**-11,806**
		27-28	0.062	0.9500	0.0082	0.0081	0.000506	**-5,551**
		28-29	0.063	1.1600	0.0100	0.0099	0.000625	**17,946**
		29-30	0.059	1.2600	0.0108	0.0108	0.000640	**27,484**
		30-35	0.170	1.6100	0.0138	0.0137	0.002329	**183,723**
		> 35	0.126	2.2400	0.0192	0.0191	0.002406	**277,313**

ANSWER **473,088**

INSTRUCTIONS

1. Change the yellow values to be relevent to the data set being considered.

2. Use the "solver" under the tools menu to update the red values.

DATASET:Nurses

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	1.0600	0.0097	0.0097	0.002129	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0092***	0.0091	0.001376	
Recovered P(D)	0.011269	**25-26**	0.075	0.9200	0.0084	0.0084	0.000629	**-11,378**
criterion	0.000000	**26-27**	0.074	0.9600	0.0088	0.0088	0.000644	**-5,589**
		27-28	0.062	1.0900	0.0100	0.0099	0.000619	**10,639**
		28-29	0.063	1.2100	0.0111	0.0110	0.000694	**25,089**
		29-30	0.059	1.3200	0.0121	0.0120	0.000714	**36,028**
		30-35	0.170	1.4900	0.0136	0.0136	0.002298	**157,301**
		> 35	0.126	1.8900	0.0173	0.0172	0.002166	**212,334**

ANSWER **424,423**

DATASET:Nurses

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,604	**< 23**	0.220	0.9100	0.0082	0.0081	0.001795	
P(D)	0.01127	**23-25**	0.151	1.0000	***0.0090***	0.0089	0.001351	
Recovered P(D)	0.011269	**25-26**	0.075	1.0000	0.0090	0.0089	0.000670	**0**
criterion	0.000000	**26-27**	0.074	1.0600	0.0095	0.0095	0.000698	**8,226**
		27-28	0.062	1.2000	0.0108	0.0107	0.000668	**23,195**
		28-29	0.063	1.3400	0.0120	0.0120	0.000754	**39,849**
		29-30	0.059	1.5000	0.0135	0.0134	0.000796	**55,214**
		30-35	0.170	1.6600	0.0149	0.0148	0.002511	**207,822**
		> 35	0.126	1.8000	0.0162	0.0161	0.002026	**187,437**

ANSWER **521,743**

INSTRUCTIONS

1. Change the yellow values to be relevent to the data set being considered.

2. Use the "solver" under the tools menu to update the red values.

DATASET:Alameda

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,606	< 23	0.220	1.3900	0.0112	0.0112	0.002461	
P(D)	0.01127	23-25	0.151	1.0000	*0.0081*	0.0080	0.001215	
Recovered P(D)	0.011269	25-26	0.075	0.9800	0.0079	0.0079	0.000591	-2,511
criterion	0.000000	26-27	0.074	0.8600	0.0069	0.0069	0.000510	-17,283
		27-28	0.062	1.2000	0.0097	0.0097	0.000601	20,871
		28-29	0.063	1.2600	0.0102	0.0101	0.000638	27,430
		29-30	0.059	1.2300	0.0099	0.0099	0.000587	22,881
		30-35	0.170	1.3600	0.0110	0.0109	0.001853	102,143
		> 35	0.126	2.7900	0.0225	0.0223	0.002813	375,960

ANSWER **529,490**

DATASET:Alameda-Non-smokers

N	209,128,094	BMI Cat	P(Cat)	HR	λ	P(D)	P(Cat)*P(D)	Num Excess Deaths
M	2,356,606	< 23	0.220	1.2300	0.0100	0.0100	0.002192	
P(D)	0.01127	23-25	0.151	1.0000	*0.0081*	0.0081	0.001222	
Recovered P(D)	0.011269	25-26	0.075	0.9400	0.0076	0.0076	0.000570	-7,582
criterion	0.000000	26-27	0.074	0.8800	0.0072	0.0071	0.000525	-14,904
		27-28	0.062	1.2300	0.0100	0.0100	0.000620	24,145
		28-29	0.063	1.0700	0.0087	0.0087	0.000546	7,436
		29-30	0.059	1.1400	0.0093	0.0092	0.000548	14,018
		30-35	0.170	1.6400	0.0133	0.0132	0.002245	182,490
		> 35	0.126	2.7600	0.0224	0.0222	0.002801	371,952

ANSWER **577,555**